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ABSTRACT

It is important to examine the correlates of drug use and abuse among early adolescents to identify common patterns and factors of the beginning stages of drug abuse. The relationships between personal substance use, health beliefs, peer use, stated intention to use drugs in the future, sex, and religion were examined using data collected from 265 early adolescents in rural northern Michigan and northeastern Wisconsin. In March/April 1983 and again in January/February 1984, subjects completed a five-part survey questionnaire which measured personal drug use, health beliefs, peer drug use, intention to use drugs in the future, and demographic variables. The pretest data suggests that approximately 42% of the sample used alcohol at least one time per year, while 7% of the sample smoked cigarettes at least once a year. Only 1.5% of the total sample reported using marihuana with any frequency, and 1.9% of the students reported using cocaine. Posttest results indicated that alcohol use increased substantially over the study year, while cigarette smoking and marihuana use increased slightly and cocaine use remained the same. A positive correlation between peer drug use and personal drug use was established. In addition, a relationship was found between health beliefs and personal substance use. A revised model designed to predict substance use applied to the entire sample for whom posttest scores were available was able to account for a statistically significant amount of the variance of alcohol, marihuana, and cigarette use at the conclusion of the experiment. (NB)

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Correlates of Youth Drug Use in Rural Northern Michigan and Northeastern Wisconsin

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Abstract

The relationships between personal substance use, health beliefs, peer use, stated intention to use drugs in the future, sex, and religion were examined using data collected from 265 early adolescents in rural northern Michigan and northeastern Wisconsin in March/April 1983 and January/February 1984. A positive correlation between peer and personal drug use was established. In addition, a relationship was found between health beliefs and personal substance use. A theoretical model designed to predict substance use applied to a subset of the sample for whom measures were available for both before and after the experimental period was unable to explain a significant amount of the variance of post-experimental substance use. A revised model applied to the entire sample for whom posttest scores were available was able to account for a statistically significant amount of the variance of alcohol, marihuana and cigarette use at the conclusion of the experiment.

Correlates of Youth Drug Use in Rural Northern Michigan and Northeastern Wisconsin

Introduction

The problem of early adolescent chemical dependency is one area of drug abuse research which has received relatively little attention in the substance abuse literature. Research focusing on early adolescent populations is necessary because early adolescence is the developmental stage where drug use most commonly begins. Yet this age group has been ignored by most investigators, who have usually concentrated on high school or older age populations. It is important to examine the correlates of drug use and abuse among early adolescents so common patterns and factors of the beginning stages of drug abuse can be identified. These findings can then be used in the diagnosis and treatment of incipient substance abuse problems.

A number of variables (e.g., genetics, ethnic group, religion, familial influence, age, sex, low self-esteem, internal-external locus of control, health beliefs, and peer pressure) have been hypothesized as being related to chemical dependency. Of these factors, age, sex, religion, health beliefs, and peer pressure have been most frequently demonstrated as being successful predictors of drug use.

Age is a variable strongly related to substance use behavior (see, for example, Johnston, Bachman, & O'Malley, 1979; Kirk, 1979; Napier, Carter, & Pratt, 1981, Nyberg, 1979). Nyberg describes the relationship between drug use patterns and age in terms of a curvilinear function (1979). As age increases, substance use also increases, peaking at the ages of about 18 to 24, followed by a general decline in use.

Age is a significant determinant of drug use for many reasons. For example, as adolescents advance in age, their need to behave as adults increases. Some authorities have hypothesized that early adolescents see drug use as one way of expressing "adult-like" behaviors.

Age is also important for reasons related to specific cohort behavioral patterns. The types of drugs adolescents considered legitimate to use in the 1940's might have been totally different from 1980 adolescents, due to differing cohort values. Each specific generation has its own taboos concerning specific drug use behaviors.

The decrease in substance use behaviors after the age of about 25 is another age-related occurrence. It may be that once people leave adolescence and young adulthood, the demands and responsibilities placed on them by the family and their jobs preclude high use of drugs.

With regard to sex differences, early research indicated that males used substances at higher frequencies and in larger quantities than did females. These differences are now diminishing, and in some populations there are no longer any significant differences between the substance use behaviors of males and females (Becker, 1977; Eichberg & Bentler, 1976; Kirk, 1979; Tolone & Dermott, 1975).

Religion appears to be strongly related to drug use behavior. Weschler and McFadden (1979) determined that Jewish-American college students have the highest prevalence rates of drinking, but the lowest frequency of alcohol abuse. They argue that the Jewish religion and culture's acceptance of alcohol has "taught" Jewish youngsters socially acceptable patterns of drinking, which in turn reduce the chance of abusive drinking styles. Cahalen notes (1970) that those people who are more religious drink less, and

when controlling for church attendance, Catholics have the highest drinking rates. Religiosity, as measured by church going behavior has been consistently shown to be inversely related to substance use (see, for example, Jessor, 1976; Weschler & McFadden, 1979). The more religious the individual, the less likely he or she will drink or use drugs (Gersick, Grady, Sexton, & Lyons, 1981).

Several recent studies have explored the beliefs and attitudes adolescents hold toward substance use behaviors (Brook, Lukoff, & Whiteman, 1978; Erickson, 1982; Hamburg, Kraemer, & Jahnke, 1975; Hartnoll & Mitcheson, 1973; Johnston et al., 1979; Kamili & Steer, 1976; Kinder, 1975; London, 1982; Seffrin & Seehafer , 1976; Skiffington & Brown, 1981). These studies have examined attitudinal domains such as youth perceptions of legal and social acceptance of chemical use as well as perceived harmfulness of specific mood-modifying substances.

Hamburg et al. (1975), Johnston, Bachman, and O'Malley (1981) and Skiffington and Brown (1981) found that attitudes concerning the harmfulness of substance use were related to substance use behavior. For example, Johnston et al. (1981) suggest that "strong correlations exist between individual use of drugs and the various attitudes and beliefs about those drugs" (85).

Johnston and associates also assessed student perceptions of the health risks associated with drug use and their legal attitudes towards substance use. Their data indicated that the perceived harmfulness of the substance was strongly related to the legality of the drug. This did not, however, apply to marihuana. Heroin, barbiturates, amphetamine, and cocaine all produced large responses reflecting a belief of great harm in their use. Regular use of cigarettes also received that value. Interestingly, few subjects felt that experimental use

of marihuana was harmful, and only a minority associated much harm with alcohol use.

Perhaps one of the most successful predictors of youth substance use is peer pressure (e.g., Ausabel, Montemayor, & Svajian, 1977; Dembo, Schneider, & Berger, 1979; Levine & Kozak, 1979; Phillipson, 1973; Schuman & Polkowski, 1975; Sutherland & Cressey, 1970; Taintor, 1976; Tolone & Dermott, 1975). The adolescent's tendency towards "gang behavior" (Havighurst, 1948) and his or her drives and needs to belong to the peer group (Erikson, 1963) make peer influence a natural factor in in a youth's decision to use drugs.

Another reason peer pressure might be influential is due to contemporary society's socialization processes and family structure. For example, Levine and Kozak (1979) suggest that deficient socialization and inadequate parenting are possible explanations for why peer pressure is influential in youth delinquent behaviors.

Two factors receiving current attention among health behavior authorities are stated intentions to engage in behavior in the future, and past behavioral patterns, as they relate to future behavior. Wong (1979) found that prior substance use may predict future substance use behaviors, and Ajzen and Fishbein have noted that expressed intention to engage in a behavior may be one of the most important factors in determining future behavior (1980).

Each of the above mentioned variables has been demonstrated to be related to substance use. It was hypothesized that several predictors would serve as a better source of estimation than any one factor alone, therefore, the proposed theoretical model used health beliefs, peer substance use, prior substance use, intentions, and demographics to predict personal substance use. The model (Figure 1) draws heavily on the ideas of Ajzen and Fishbein (1980), Herbert Wong (1979), and the Health Belief Model (see, for example, Rosenstock, 1974).

Method

Sample The study's population was one school system in Michigan's Upper Peninsula and one school in northeastern Wisconsin. This geographic region was chosen for two reasons: (1) earlier research had demonstrated that substance abuse was a problem in this specific population (Sarvela & McClendon, 1983a, 1983b; Sarvela & McClendon, in press; Sarvela, Takeshita, & McClendon, in press) and (2) limited research has been conducted concerning the unique drug abuse problems of rural America. *

The two towns fell under the rubric of "rural" when using the NIDA (1981) classification system (that being, geographic regions with populations under 25,000 people outside of a SMSA). The two populations added together did not total 25,000. Each school system enrolled students who lived in town and outside of the city limits. The population density of the Michigan county was approximately 25 per square mile, while the Wisconsin county's population density was 28.5 per square mile.

All students in the 1982-1983 6th grade classes of the two school systems were eligible to participate in the study, contingent upon parental approval. Letters of consent were sent to the parents outlining the purpose and procedures of the study. Of the 350 students in both schools, 265 or 75.7% of the sample received parental permission to take part in the study. Males comprised 43% of the sample. With regard to religion, 44.5% of the sample was Protestant, while 43.7% indicated that they were of Catholic background. An additional 11.7% of the students responded to either the "none" or "other" category of the religion question.

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* The results presented here represent one aspect of a larger study, which focused on rural early adolescent drug use and drug education.

Research Design and Instrumentation Data for this study were based on a self-administered questionnaire taken at two points in time (March/April, 1983 and January/February, 1984). The instrument used in the study was developed by the investigators and pilot tested twice: (1) during the initial needs assessment (1981, N = 496) and (2) the field test (1982, N = 181). The field tests were administered in the Michigan school system during the two years prior to the actual study. No student taking part in the present study had been exposed to the questionnaire before-hand. The surveys were administered by school teachers and guidance counselors in the school classrooms.

Based on the results of the needs assessment and field test, appropriate changes were made in the survey instruments, such as the rewording of questions, the deletion of poor items, and the addition of questions not included in the earlier surveys which were considered important after examining data provided by the field tests. From the field test data, it was determined that alcohol, cigarettes, and marihuana would be the most important drugs on which to focus in this population since their incidence rates were highest. Cocaine was added to the questionnaire because of recent media attention concerning its use. Chemicals such as LSD, mescaline, heroin, and barbiturates had an extremely low frequency of use in the field tests, and therefore were not studied.

The survey was composed of five major parts, each component reflecting a specific element of the theoretical construct tested. The questionnaire measured personal drug use, health beliefs, peer use, and at pretest time, intention to use drugs in the future. In addition, demographic items such as grade level, sex, religion, and the state in which the subject lived were included.

Instrument reliability was evaluated using two strategies: (1) test-retest methods and (2) the reported use of bogus drugs to test subject honesty (a form of systematic error).

Test-retest strategies were used to measure the relative stability of the instrument over time. Using the total populations of the needs assessment and the field test as the unit of analysis, the results yielded no major variations between the findings. The trends in drug usage were identical at each point in time, that is, alcohol was the most commonly used drug, followed by cigarette smoking, then marihuana. In addition, the pretest measurements of the present study were similar to the findings of the field study and needs assessment, suggesting that the instrument was stable.

The second method of assessing instrument reliability tapped the amount of systematic error that was present due to subject intentional misreporting. This reliability measure utilized lie scale questions based on bogus drug usage, which produced a measure of respondent honesty in answering questions. In the field test, the reliability of these measures was above 94% for each question. For the present study, reported drug use reliability was above 98% for each lie scale item.

The instrument's content validity was self-evident. It measured the use of specific drugs using well-defined Likert scales. The substance use questions addressed the total universe of the element being studied, that is, all possible behavioral tendencies to use a substance were examined by the instrument. The health belief questions appeared to have an adequate degree of content validity as well, since they discriminated between the perceived health of engaging in certain behaviors through the use of explicit, clearly defined Likert scales.

Regression Analysis The 1st multiple regression model tested in this experiment was:

$$Y' = \beta_0 + \beta_1 x_1 + \ldots + \beta_8 x_8 + \epsilon$$

where:

Y' = frequency (or quantity) of substance used

x_1 = individual's past health beliefs

x_2 = individual's prior frequency of use of that substance

x_3 = individual's prior quantity of use of that substance

x_4 = individual's intention to use the substance in the future

x_5 = peer frequency of use of the substance

x_6 = peer quantity of use of the substance

x_7 = number of peers who use the substance

x_8 = sex of the subject

ϵ = residual

The second regression model tested (revised model) was as follows:

$$Y'' = \beta_0 + \beta_1 x_1 + \ldots \beta_5 x_5 + \epsilon$$

where:

Y'' = frequency (or quantity) of substance used

x_1 = individual's present health beliefs

x_2 = peer frequency of use of the substance

x_3 = peer quantity of use of the substance

x_4 = number of peers who use the substance

x_5 = sex of the subject

ϵ = residual

Results

The pretest data suggested that approximately 42% of the sample used alcohol at least one time per year, while approximately 7% of the population smoked cigarettes at least once a year. Only 1.5% of the total sample reported using marihuana at any frequency, and 1.9% of the students reported using cocaine. Posttest results indicated that alcohol use increased substantially over the study year. In addition, cigarette smoking and marihuana use increased slightly. Cocaine use remained at about the same level. Data summarizing pre- and post- test drug use appear as Table 1.

insert Table 1 about here

In general, the trends regarding peer use were similar to those of reported personal use, although peer use was reported at slightly higher rates. Alcohol was the most popular drug used by peers, followed by cigarettes, marihuana, and cocaine. These data are found in Table 2.

insert Table 2 about here

Subject perceptions of the relative risks of engaging in certain substance use behaviors were tapped at pretest time as well. In general, the following trend was present: marihuana was thought to be the most dangerous; cocaine was the next dangerous; alcohol and cigarette use were considered the least dangerous of the four drugs examined. Posttest results revealed similar findings, with the majority of the subjects suggesting that substance use had a negative impact on personal health. Table 3 shows the pre- and post- test results concerning student health beliefs.

Data related to subject intentions to use drugs in the future were collected at pretest time as well (Table 4). Approximately 24% of the sample planned on using alcohol in the next 6 months. About 6% of the sample indicated that they would smoke cigarettes in the future, while 8% suggested that they would use marihuana. Interestingly, 6.1% of the students surveyed answered that they expected to use cocaine in the next 6 months, a rate equal to student intentions to smoke cigarettes.

insert Tables 3 and 4 about here

The results (based on pretest data) appearing in Table 5 suggested that significant relationships existed between the drug use rates of adolescents and their peers. ** The strength of the relationships seemed to be a function of the drug being used. That is, marihuana produced the strongest relationship (.94) and alcohol the least powerful (.69). However, all substances tested produced an extremely high positive relationship between peer and personal substance use.

insert Table 5 about here

** The measurement of peer use in this study was used as an indirect metric of peer pressure, based on Erikson's (1963) hypothesis that early adolescents have drives and needs to belong to their peer group. Therefore, if an adolescent's friends are using marihuana, the adolescent probably feels some need to use the drug as well, in order to "belong" to the group.

The data confirmed the hypothesis that there was a significant relationship (positive correlation) between health beliefs and behavior as well. Table 6 shows that marihuana produced the highest correlation (.73) between personal substance use and its corresponding health beliefs, while alcohol (.41) produced the lowest correlational values.

insert Table 6 about here

The theoretical model was evaluated next. Analysis of the data using 54 paired scores which were available for the analysis did not confirm the hypothesis. *** The multiple regression model was not able to account for a statistically significant amount of the variance. In addition, the model could be tested for alcohol use only, because of a lack of variance in the population's use of cigarettes, cocaine, and marihuana, which created singular covariance matrices, making the regression analyses impossible to conduct. Table 7 shows the correlation matrix between the variables predicting frequency of alcohol use, while Table 8 displays the regression results.

insert Tables 7 and 8 about here

A revised model (Figure 2) was then tested. This model was based on posttest results only (a cross-sectional design rather than a panel method). The rationale for developing this model was that past health beliefs and peer use were not solid predictors, therefore, it was important to assess

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***The number of paired scores available for analysis were reduced because of the major coding errors at site.

immediate time frame beliefs and peer use behaviors to predit personal substance use behavior. These models were very successful in predicting actual substance use, accounting for about .50 (alcohol) to .28 (marihuana) of the variance of drug use. The prediction of cocaine use was not significant. Indeed, both marihuana and cocaine r square values were probably low due to the small incidence in use of the substance rather than theoretical problems. Peer use factors were the strongest predictors of drug use, while health beliefs were significant variables for alcohol and cigarette use. Sex differences were found to be a factor with alcohol use as well (consistent with normative data, males used more alcohol than females). Table 9 shows the results of the alcohol use relationships, while the regression analysis appears as Table 10. The correlations of cigarette use are found in Table 11, while the regression results appear as Table 12. The marihuana correlation matrix appears as Table 13, and the regression findings are found in Table 14.

insert Tables 9 to 14 about here

Discussion

The data indicated that alcohol use in the study population was much higher than comparable data based on national samples. For example, Johnston et al. (1979) found that 9% of their target population had first experimented with alcohol at the 6th grade, while the present study's data indicate that 42% of the subjects used alcohol at least once a year. Interestingly, the use rates of the other drugs were comparable to those found in national samples.

These frequency data indicate that alcohol use in rural northern Michigan and northeastern Wisconsin is about 3 1/2 times greater than that shown in national studies. The results suggest that alcohol use begins at an earlier age in rural Upper Great Lakes communities than it does in the U.S. as a whole. Because of this, alcohol education should begin before the 6th grade, to reduce the prevalence of substance abuse during its incipient stages of development.

Drug use was found to be highly correlated with peer use. The strength of the relationship was dependent upon the substance used, where marihuana produced the highest correlation, and alcohol the weakest. These data may indicate that individual participation is more important in a peer group that smokes marihuana than in one that uses alcohol. In addition, the data strongly suggest that health education programs in the future should focus on peer drug use and the associated peer pressure. This recommendation is supported by research conducted by Dielman, Leech, Lyons, Lorenger, Klos and Horvath (in press) which has shown that role-modeling methods incorporating mock situations where peer pressure was present reduced cigarette smoking in elementary youth. This strategy may have potential in other drug education programs as well.

Health beliefs about the use of a particular drug was found to be significantly related to substance use behavior. Students who felt drug use was dangerous for one's health used less drugs, while those who felt use was not as dangerous used more drugs. These data suggest that health beliefs may in fact have an impact on an individual's decision to use a particular drug. Shaping appropriate drug use health beliefs at an early age may well be an appropriate health education goal. This objective might best be

met through an elementary school health education program which emphasizes healthy living practices.

The health belief findings appear to confirm in part the validity of the Fishbein and Ajzen paradigm as well as the Health Belief Model (e.g., Rosenstock, 1974). Each model suggests that attitudes towards a specific behavior are instrumental in the individual's decision to engage in the behavior. Although causality cannot be determined due to the cross-sectional nature of the design, the existence of a relationship between health beliefs and drug use was established in the analysis.

The hypothesized model was unable to account for a statistically significant amount of the variance of alcohol use. These findings suggest that past beliefs, behaviors, and expressed intentions do not necessarily predict future behaviors in the rural early adolescent population. This may be due to a number of factors. One explanation might be that during the period of early adolescence, beliefs toward certain behaviors are constantly being reshaped due to their transient personal life status. A belief held at one time concerning a particular substance might change dramatically a year or even six months later.

Another possible explanation for the unexpected findings might be that the structure of the peer groups is also changing. Those peer factors which were strong predictors of substance use one year ago no longer serve as predictors at the present time, because the adolescents may not be associating with the same people they were interacting with a year earlier.

Yet another factor that might explain the unexpected results is that there was an experimental treatment interference due to the health education program that was implemented during the study. Although this explanation

seems possible, an analysis of the bivariate relationships appears to refute this argument, since both the pre- and post-test results indicated that peer use and health beliefs were strongly related to actual substance use.

Finally, the small number of subjects actually tested by the original model (54 paired scores) might have influenced the outcomes. Had the total sample been used, the model's results might have been stronger and more conclusive.

Although the original theoretical model was unsuccessful in predicting substance use behavior, the revised model was able to explain a statistically significant amount of the variance in alcohol, cigarette, and marihuana use.

For the three drugs examined in the revised analysis, peer use of the substance appeared to be the strongest indicator. Within the peer dimension of the study, the number of peers who used a particular substance produced the highest beta weights for cigarette and marihuana use, while the strongest beta weights for alcohol use were obtained by peer frequency of use of alcohol.

Health beliefs produced significant beta weights for alcohol and cigarette use, but not marihuana. These data may suggest that youth behave in a manner consistent with their belief structures with certain drugs, such as alcohol and cigarettes, but inconsistently with other substances, such as marihuana. This finding may further support cognitive dissonance theory, since it appears that in the case of marihuana use, peer factors override health beliefs in youth decisions to use the substance.

Interestingly, there were no significant differences between Protestants, Catholics, and the "other" category substance use behaviors. These data suggest that regardless of religion, substance use behaviors remain relatively consistent in this population. This may be due to the fact that the students sampled were primarily of the Catholic or Protestant faiths. If

Jewish students, Muslims, or students of other religions were in the sample, religious differences might be more distinct.

With regard to sex, significantly more males than females used alcohol in this population. No significant differences were found between males and females use of cigarettes and marihuana. In accordance with the findings of many other studies, alcohol use among pre-teens and early teens appeared to be primarily a male activity. Sex does not, however, appear to be a moderating variable for the other drugs studied. These data further support the notion that the differences between male and female substance use behaviors are diminishing.

Recommendations

Peer substance use was by far the best indicator of individual substance use in this population. This may be the key to future success in drug education. In addition, therapists ought to include strategies for coping with peer pressure in their adolescent treatment programs. More detailed research is needed to explore the nature of peer pressure and its effects on drug use. This study has provided data concerning the descriptive bivariate relationships between peer and personal drug use, but has not explored in depth how and why peer pressure moderates drug use. A phenomenologically based study might provide better answers to this question.

The findings concerning the relationships between health beliefs and their related behaviors were also positive, and should be considered when designing future drug education programs. A drug education curriculum which fosters health beliefs at an early age may be an effective approach to reducing early adolescent substance abuse in its developmental stages. Therapists might

focus on developing healthy attitudes towards drug use with their clients, since they appear to be closely linked to substance use behavior.

Future research is needed to determine whether these findings are applicable to rural Upper Great Lakes adolescents alone, or do they describe adolescents of other rural regions, or even urban areas, as well. A more geographically dispersed sample would greatly enhance the generalizability of the results.

A greater distribution in age of the subjects could demonstrate age related changes between the correlates of substance use behavior. It may be that the theoretical model proposed is more appropriate for older adults, where belief systems and peer group structures are more stable.

Finally, the theoretical model's predicting power may have been interfered with by the drug education program. Future research should concentrate on separate problems, with one study assessing the effectiveness of the theoretical model, while the other study examines the effects of drug education on substance use behaviors and beliefs. This would reduce interaction between the variables and permit each to be tested independently.

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TABLE 1

FREQUENCY OF PERSONAL SUBSTANCE USE *

Expressed in Percentages

	N	Total	Never	Once a year	4 or 5 times a year	4 or 5 times a month	More than once a week
Alcohol							
pretest	265	100.0	58.1	19.6	16.2	3.8	2.3
posttest	246	100.0	41.1	28.5	19.5	8.5	2.4
Cigarettes							
pretest	264	100.0	92.8	4.5	0.8	0.4	1.5
posttest	246	100.0	91.9	3.7	2.0	0.4	2.0
Marihuana							
pretest	264	100.0	98.5	1.1	0.4	0.0	0.0
posttest	248	100.0	97.6	1.2	1.2	0.0	0.0
Cocaine							
pretest	264	100.0	98.1	1.5	0.0	0.4	0.0
posttest	246	100.0	99.2	0.4	0.4	0.0	0.0

* Quantity of personal alcohol and cigarette use appear as Appendices A and B.

TABLE 2

FREQUENCY OF PEER SUBSTANCE USE *

Expressed in Percentages

	N	Total	Never	Once a year	4 or 5 times a year	4 or 5 times a month	More than once a week
Alcohol							
pretest	260	100.0	51.2	18.8	18.8	7.7	3.5
posttest	244	100.0	43.0	17.2	23.0	13.5	3.3
Cigarettes							
pretest	262	100.0	71.0	8.0	6.5	6.1	8.4
posttest	245	100.0	75.5	4.1	4.5	4.1	11.8
Marihuana							
pretest	262	100.0	95.8	2.3	1.5	0.0	0.4
posttest	246	100.0	92.3	2.0	1.6	2.8	1.2
Cocaine							
pretest	263	100.0	96.6	1.1	1.5	0.8	0.0
posttest	244	100.0	96.3	0.8	1.6	0.4	0.8

* Number and quantity of peer substance use appear as Appendices A, B, and C

TABLE 3

SUBSTANCE USE HEALTH BELIEFS

Expressed in Percentages

	N	Total	Very bad	Bad	No harm	Good	Very good
Alcohol							
pretest	264	100.0	48.5	43.9	5.3	0.4	1.9
posttest	247	100.0	48.5	38.4	8.5	1.2	3.2
Cigarettes							
pretest	264	100.0	42.8	49.6	5.3	0.4	1.9
posttest	246	100.0	48.0	41.5	6.1	1.2	3.3
Marihuana							
pretest	263	100.0	90.1	7.6	0.4	0.0	1.9
posttest	246	100.0	82.1	11.0	2.0	0.4	4.5
Cocaine							
pretest	264	100.0	86.0	11.0	0.8	0.0	2.3
posttest	247	100.0	85.8	7.7	0.8	0.8	4.9

TABLE 4

INTENTION TO USE SUBSTANCES IN THE FUTURE

Expressed in Percentages

	N	Total	Yes	No
Alcohol	262	100.0	23.7	76.3
Cigarettes	261	100.0	6.1	93.9
Marihuana	263	100.0	7.6	92.4
Cocaine	264	100.0	6.1	93.9

TABLE 5

CORRELATION BETWEEN PEER AND PERSONAL SUBSTANCE USE

Goodman-Kruskal Gamma

N = 255

	Number of peers who use	Frequency of peers' use	Quantity of peers' use
Personal Use of:			
Alcohol Frequency	.71 *	.70 *	.69 *
Alcohol Quantity	.75 *	.70 *	.80 *
Cigarettes Frequency	.83 *	.75 *	.89 *
Cigarettes Quantity	.88 *	.78 *	.93 *
Marihuana	.90 *	.94 *	na
Cocaine	.87 *	.89 *	na

* = sig .01

TABLE 6

CORRELATION BETWEEN HEALTH BELIEFS AND PERSONAL SUBSTANCE USE

Goodman-Kruskal Gamma Analysis

N = 255

	Health belief
Personal Use of:	
Alcohol Frequency	.45 *
Alcohol Quantity	.41 *
Cigarettes Frequency	.55 *
Cigarettes Quantity	.53 *
Marihuana	.73 *
Cocaine	.71 *

* = sig .01

TABLE 7

ZERO-ORDER CORRELATION MATRIX
FREQUENCY OF ALCOHOL USE VARIABLES

N = 49

(1)	Current alcohol use	1.0000										
(2)	Alcohol health beliefs	.1372	1.0000									
(3)	Frequency of alcohol use	.1036	.4163*	1.0000								
(4)	Quantity of alcohol use	.2099	.5310*	.6453	1.0000							
(5)	Number of peers who use alcohol	.0799	.5249*	.5070*	.5589*	1.0000						
(6)	Frequency of peers' alcohol use	.1620	.4808*	.4464*	.5137*	.8242*	1.0000					
(7)	Quantity of peers' alcohol use	.0961	.4520*	.3559*	.5611*	.7596*	.7520*	1.0000				
(8)	Intention to use alcohol in the future	.1715	.4309*	.5119*	.5688*	.4404*	.3873*	.4706*	1.0000			
(9)	Protestant	.0205	.0714	.0049	.0283	.0889	.0949	-.0957	.1491	1.0000		
(10)	Catholic	.1030	.0723	.1646	.0509	.0804	.0588	.0539	-.0906	-.1201	1.0000	
(11)	Other	.1003	.1774	.0594	-.0026	.0491	.0371	-.0837	-.0206	.5217*	.5431*	1.0000
(12)	Sex	.2505	.0157	.0991	.2821*	.1650	.1379	.1264	.0263	-.2545	-.0635	-.1027	1.0000
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

*significance .05

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TABLE 8

RESULTS OF THEORETICAL MODEL
(FREQUENCY OF ALCOHOL USE)

ANALYSIS OF VARIANCE

Source	Degrees of freedom	Sum of squares	Mean square	F-statistic	Significance
Regression	11	.15436	.14033 -1	.61398	.8049
Error	37	.84564	.22855 -1		
Total	48	1.0000			

Mult R = .44859 R-Sqr = .20124 SE = .15107

Variable	Partial	Beta wt	Standard error	T-statistic	Significance
Alcohol health beliefs (pretest)	.05725	.71133 -1	.20394	.34879	.7292
Past frequency of alcohol use	-.06692	-.91725 -1	.22482	- .40800	.6856
Past quantity of alcohol use	.0350	.98622	.25480	.38705	.7009
Past number of peers who use alcohol	-.15170	-.29050	.3116	- .93359	.3566
Past frequency of peer alcohol use	.16576	.29808	.29154	1.0224	.3132
Past quantity of peer alcohol use	-.04793	-.84201 -1	.28847	- .29189	.7720
Past intention of use alcohol in the future	-.14321	-.18207	.20685	- .88091	.3844
Sex	-.24191	-.26909	.17744	-1.5165	.1379
Protestant	.04021	.60536 -1	.24738	.24481	.8080
Catholic	.10991	.15686	.23321	.67262	.5054
Other	.00248	.41313 -2	.27354	.15103 -1	.9880

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TABLE 9

ZERO-ORDER CORRELATION MATRIX
POSTTEST ALCOHOL USE

N = 218

(1) Frequency of personal alcohol use	1.0000								
(2) Alcohol health beliefs	.3009*	1.0000							
(3) Number of peers who use alcohol	.6077*	.2238*	1.0000						
(4) Frequency of peers' alcohol use	.6421*	.2487*	.7783*	1.0000					
(5) Quantity of peer's alcohol use	.5239*	.1451*	.6863*	.7429*	1.0000				
(6) Protestant	-.1141	.0787	.0266	-.0197	-.0503	1.0000			
(7) Catholic	-.0308	-.0250	-.1121*	-.0937	-.1542*	-.1256	1.0000		
(8) Other	-.0571	.0362	-.0708	-.1288	.3811*	.3816*	.0069	1.0000	
(9) Sex	.2054*	.1843*	.0235	.1007	.0728	-.1018	-.0374	.0069	1.0000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

*significance .05

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TABLE 10

REVISED MODEL
(FREQUENCY OF ALCOHOL USE)

ANALYSIS OF VARIANCE

Source	Degrees of freedom	Sum of squares	Mean square	F-statistic	Significance
Regression	8	.49573	.61967 -1	26.666	.0000
Error	217	.50427	.23238 -2		
Total	225	1.000			

Mult R = .70408 R-Sqr = .49573 SE = .48206 -1

Variable	Partial	Beta wt	Standard error	T-statistic	Significance
Alcohol health beliefs	.17044	.12998	.51012 -1	2.5481	.0115
Number of peers who use alcohol	.22986	.28164	.80950 -1	3.4792	.0006
Frequency of peers' use of alcohol	.25624	.34527	.88415 -1	3.9051	.0001
Quantity of peers' use of alcohol	.04208	.47284 -1	.76210 -1	.62044	.5356
Sex	-.18002	-.13398	.49698 -1	-2.6959	.0076
Protestant	-.12693	-.10588	.56165 -1	-1.8851	.0608
Catholic	.03986	.32872 -1	.55945 -1	.58757	.5574
Other	.03246	.28780 -1	.60152 -1	.47846	.6328

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TABLE 11

ZERO-ORDER CORRELATION MATRIX
POSTTEST CIGARETTE USE

N = 216

(1) Frequency of personal cigarette use	1.0000								
(2) Cigarette health beliefs	.1637*	1.0000							
(3) Number of peers who use cigarettes	.4707*	.0718	1.0000						
(4) Frequency of peers' cigarette use	.3339*	.0960	.8262	1.0000					
(5) Quantity of peers' cigarette use	.3106*	.1198	.8210*	.8106*	1.0000				
(6) Protestant	-.0379	.0545	.0438	.0197	.0480	1.0000			
(7) Catholic	-.1761*	-.0176	-.0911	-.1194	-.1010	-.1400*	1.0000		
(8) Other	-.1256	.0744	-.0224	-.0242	-.0391	.3369*	.3393*	1.0000	
(9) Sex	.0706	.0525	-.0172	-.0435	.0256	-.0989	-.0288	.0222	1.0000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

*significance .05

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TABLE 12

REVISED MODEL
(FREQUENCY OF CIGARETTE USE)

ANALYSIS OF VARIANCE

Source	Degrees of freedom	Sum of squares	Mean square	F-statistic	Significance
Regression	8	.29736	.37170 -1	11.426	.0000
Error	216	.70264	.32530 -2		
Total	224	1.0000			

Mult R = .54531 R-Sqr = .29736 SE = .57035 -1

Variable	Partial	Beta wt	Standard error	T-statistic	Significance
Cigarette health beliefs	.17028	.14673	.57775 -1	2.5396	.0118
Number of peers who use cigarettes	.39979	.73507	.11467	6.4103	.0000
Frequency of peers' use of cigarettes	-.06214	-.10315	.11273	- .91507	.3612
Quantity of peers' use of cigarettes	-.14470	-.23935	.11137	-2.1492	.0327
Sex	-.08651	-.74000 -1	.57984 -1	-1.2762	.2033
Protestant	-.04492	-.42571 -1	.64418 -1	- .66085	.5094
Catholic	-.12198	-.11627	.64373 -1	-1.8062	.0723
Other	-.07243	-.72604 -1	.68029 -1	-1.0673	.2870

TABLE 13

ZERO-ORDER CORRELATION MATRIX
POSTTEST MARIHUANA USE

N = 223

(1) Frequency of personal marihuana use	1.0000							
(2) Marihuana health beliefs	.0454	1.0000						
(3) Number of peers who use marihuana	.3808*	.1592*	1.0000					
(4) Frequency of peers' marihuana use	.1546*	.1118	.0607*	1.0000				
(5) Protestant	.0293	.0630	.0094	.0425	1.0000			
(6) Catholic	.0322	-.0227	-.0657	-.0476	-.1252	1.0000		
(7) Other	.0030	-.0296	-.0923	-.0632	.3392*	.3405*	1.0000	
(8) Sex	.1421*	.0906	.0646	-.0064	-.1002	-.0371	-.0025	1.0000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

*significance .05

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TABLE 14

REVISED MODEL
(FREQUENCY OF MARIHUANA USE)

ANALYSIS OF VARIANCE

Source	Degrees of freedom	Sum of squares	Mean square	F-statistic	Significance
Regression	7	.27608	.39440 -1	12.258	.0000
Error	225	.72392	.32174 -2		
Total	232	1.0000			

Mult R = .52544 R-Sqr = .27608 SE = .56722 -1

Variable	Partial	Beta wt	Standard error	T-statistic	Significance
Marihuana health beliefs	-.04641	-.40310 -1	.57847 -1	- .69684	.4866
Number of peers who use marihuana	.48968	.95778	.11369	8.4243	.0000
Frequency of peers' use of marihuana	-.36531	-.66329	.11268	-5.8865	.0000
Sex	-.09736	-.84787 -1	.57779 -1	-1.4674	.1437
Protestant	.06898	.66177 -1	.63808 -1	1.0371	.3008
Catholic	.07419	.70564 -1	.63236 -1	1.1159	.2657
Other	-.00112	-.11264 -2	.67347 -1	- .16726 -1	.9867

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FIGURE 1

HYPOTHESIZED RELATIONSHIP BETWEEN PEER SUBSTANCE USE HEALTH BELIEFS AND PERSONAL SUBSTANCE USE

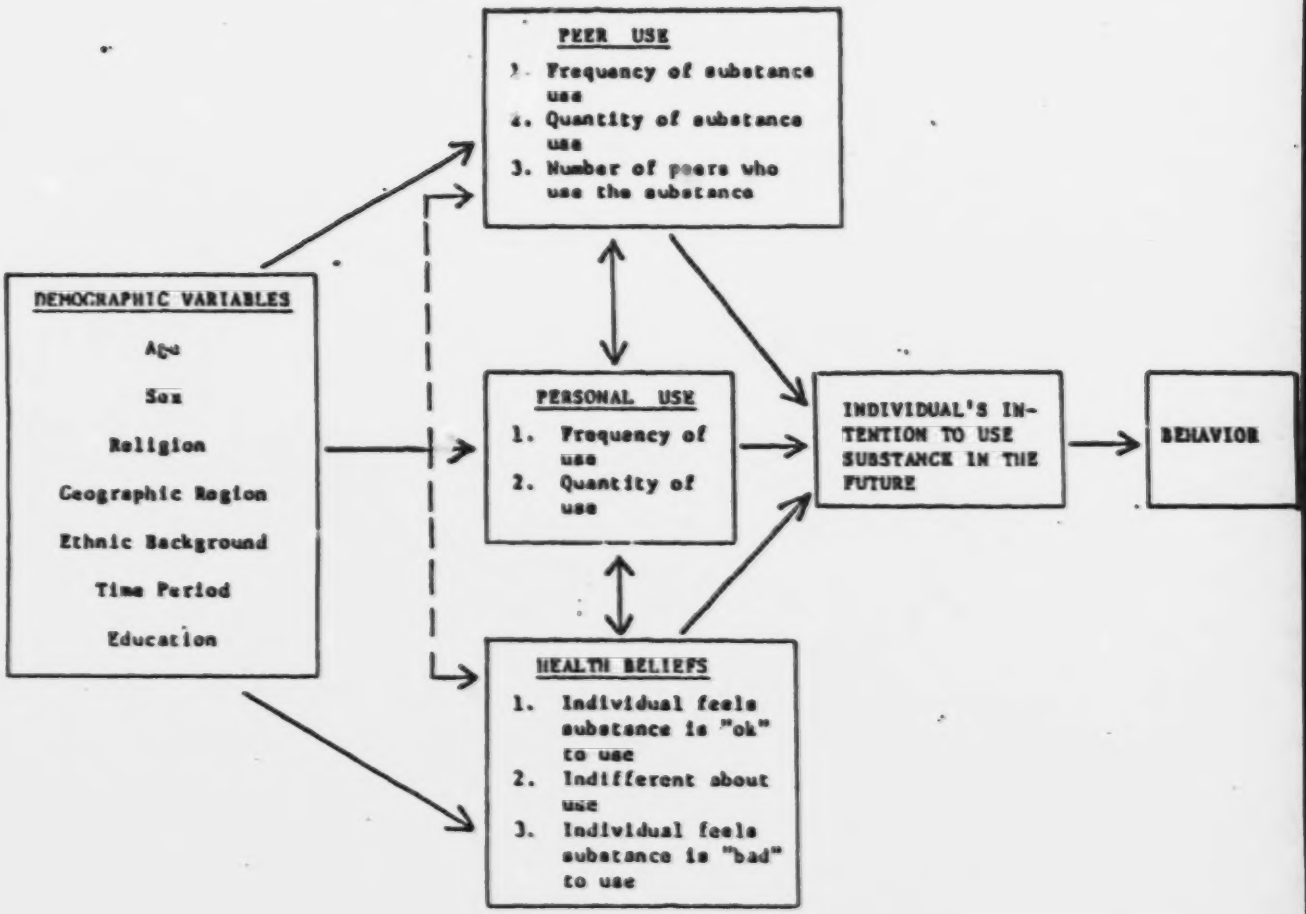
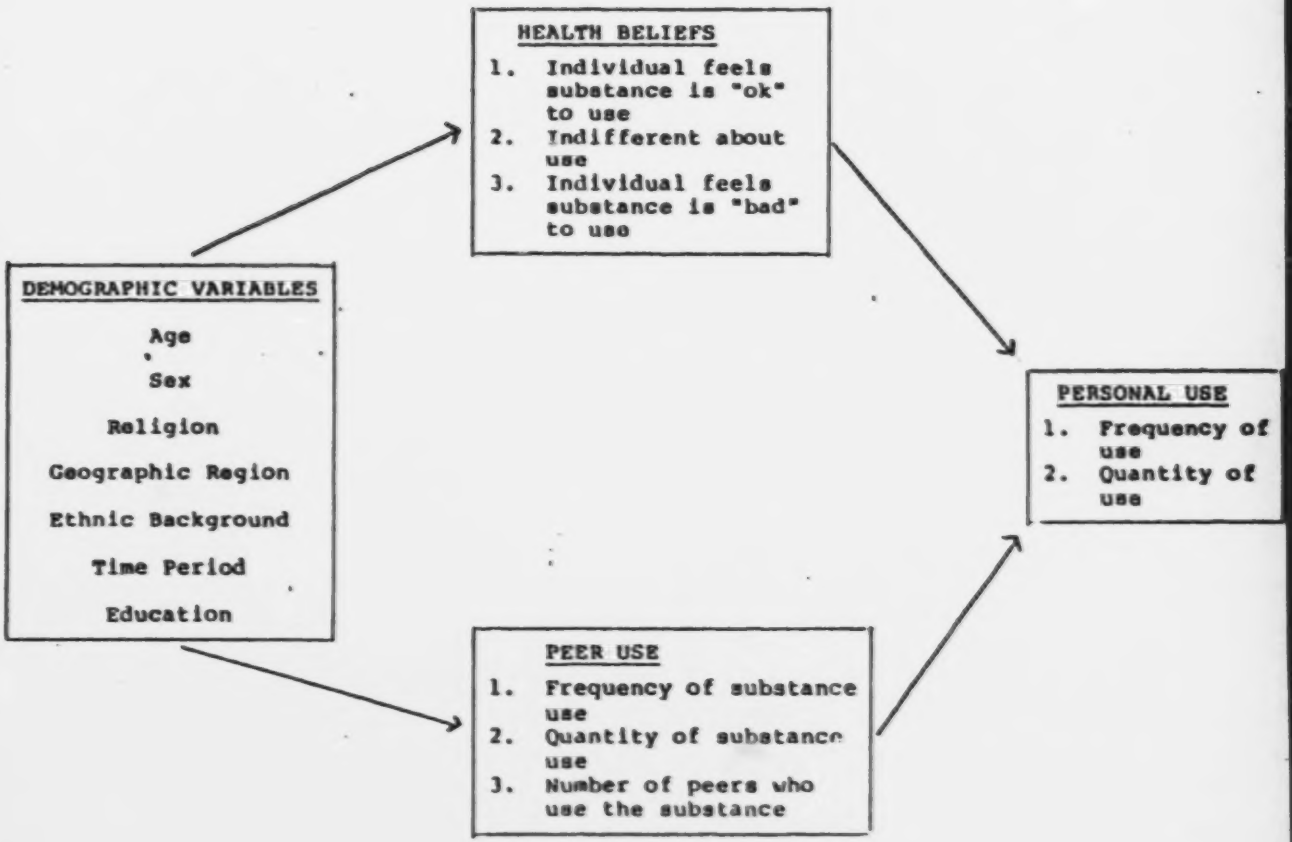


FIGURE 2

REVISED MODEL



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AUTHORS' NOTE

This paper is based on the first author's doctoral dissertation, completed at The University of Michigan in 1984.

APPENDIX A

QUANTITY OF ALCOHOL USE

Expressed in Percentages

	N	Total	Never	1-2 Drinks at a sitting	3-4 Drinks at a sitting	5-6 Drinks at a sitting	6 or More drinks at a sitting
Personal							
pretest	261	100.0	66.7	29.9	2.3	0.4	0.8
posttest	241	100.0	53.9	41.5	4.1	0.4	0.0
Peer							
pretest	256	100.0	59.0	32.0	5.9	2.0	1.2
posttest	256	100.0	50.6	34.2	9.5	2.9	2.9

APPENDIX B

QUANTITY OF CIGARETTE USE

Expressed in Percentages

	N	Total	Never	1-9 A Day	10-15 A Day	16-20 A Day	20 or More a Day
Personal							
pretest	263	100.0	95.8	3.8	0.4	0.0	0.0
posttest	243	100.0	93.8	6.2	0.0	0.0	0.0
Peer							
pretest	259	100.0	73.0	25.5	1.2	0.0	0.4
posttest	244	100.0	77.9	20.5	1.2	0.4	0.0

APPENDIX C

NUMBER OF PEERS WHO USE SUBSTANCES

Expressed in Percentages

	N	Total	None	A Few	Some	Most	All
Alcohol							
pretest	264	100.0	56.1	32.2	8.7	2.7	0.4
posttest	245	100.0	49.8	30.2	12.7	5.3	2.0
Cigarettes							
pretest	263	100.0	71.5	22.1	4.6	1.5	0.4
posttest	243	100.0	74.9	16.9	5.3	2.5	0.4
Marihuana							
pretest	262	100.0	96.6	3.1	0.4	0.0	0.0
posttest	246	100.0	91.9	6.1	1.2	0.4	0.4
Cocaine							
pretest	263	100.0	97.0	1.9	1.1	0.0	0.0
posttest	244	100.0	96.7	2.0	0.4	0.0	0.8